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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/098,730	06/18/1998	TOMIO SUGIYAMA	PM-254782	4440

23117 7590 05/14/2010

NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203

EXAMINER	
OLSEN, KAJ K	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
05/14/2010	PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TOMIO SUGIYAMA, HIROMI SANO, MASAHIRO SHIBATA, and SYUICHI NAKANO

Appeal 2009-009386
Application 09/098,730
Technology Center 1700

Decided: May 13, 2010

Before EDWARD C. KIMLIN, BRADLEY R. GARRIS, and TERRY J. OWENS, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

The Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1, 2, 4, 6, 7, 10, 11, 18-22 and 24-48, which are all of the pending claims. The rejection of claims 24, 27, 34 and 40 is withdrawn in the Examiner's answer (Ans. 2). Those claims now stand objected to as

dependent from a rejected claim but allowable if rewritten in independent form (Ans. 2, 6). We have jurisdiction under 35 U.S.C. § 6(b).

The Invention

The Appellants claim a multilayered air-fuel ratio sensor which, the Appellants state, is useful for controlling an air-fuel ratio of a gas mixture supplied to a combustion chamber of an internal combustion engine (Spec. 1:4-6). Claim 1 is illustrative:

1. A multilayered air-fuel ratio sensor having a plurality of stacked layers comprising:

a plurality of substrate layers comprising at least one solid electrolytic substrate layer and at least one insulating substrate layer; and

a boundary layer interposed immediately between said solid electrolytic substrate layer and said insulating substrate layer without any other intervening layer;

wherein each of said solid electrolytic substrate layer, said insulating substrate layer, and said boundary layer is obtained by sintering original particles of a source material so as to change the original particles to sintered particles, and an average size of the sintered particles of said boundary layer is adjusted to be larger than an average size of the sintered particles of each of said solid electrolytic substrate layer and said insulating substrate layer.

The References

Suzuki	4,177,122	Dec. 4, 1979
Watanabe	4,370,393	Jan. 25, 1983
Ikezawa	4,421,787	Dec. 20, 1983
Mase (Mase '126)	4,559,126	Dec. 17, 1985
Mase (Mase '456)	4,861,456	Aug. 29, 1989

The Rejections

The claims stand rejected under 35 U.S.C. § 103 as follows: claims 1, 2, 4, 6, 7, 10, 11, 18-22, 26, 29-33, 36-39 and 42-48 over Mase '456 in view of Suzuki; claims 25, 28, 35 and 41 over Mase in view of Suzuki and either

Watanabe or Ikezawa; and claims 37 and 43 over Mase '456 in view of Suzuki and Mase '126.

OPINION

We affirm the rejections.

Issue

Have the Appellants indicated reversible error in the Examiner's determination that the applied prior art would have rendered prima facie obvious, to one of ordinary skill in the art, an average size of boundary layer sintered particles which is larger than an average size of sintered particles of each of an adjacent solid electrolytic substrate layer and an adjacent insulating substrate layer (claims 1, 2, 4, 6, 7, 10, 11, 18-22 and 25, 26, 28-33, 35, 36, 38, 39, 41, 42 and 44-48), or a solid electrolytic substrate layer made of partially-stabilized zirconia and a boundary layer made of alumina, where a thermal expansion coefficient of the partially-stabilized zirconia is substantially the same as that of the alumina (claims 37 and 43)?

Claims 1, 2, 4, 6, 7, 10, 11, 18-22 and 25, 26, 28-33, 35, 36, 38, 39, 41, 42 and 44-48

Findings of Fact

Mase '456 discloses a multilayered air-fuel ratio sensor comprising an electrical insulating layer (54) (which corresponds to the Appellants' boundary layer), immediately on one side of which is a solid electrolyte body (28) (which corresponds to the Appellants' solid electrolytic substrate) and immediately on the other side of which is an inner gastight ceramic layer (50) (which corresponds to the Appellants' insulating substrate layer) (col. 2, l. 60 – col. 3, l. 2; col. 5, ll. 26-27; col. 8, ll. 1-4, 11-14, 17-20; Fig. 3).

Suzuki discloses an oxygen concentration sensor wherein pores of a layer having coarse alumina grains are larger than pores of a layer having fine alumina grains (col. 2, ll. 38-49).

Analysis

The Appellants argue that there is no teaching or suggestion in Mase '456 that the electrical insulating layer (54) must be more or less porous than adjacent layers (Br. 16).

As pointed out by the Examiner (Ans. 7-8), the Appellants have not challenged the Examiner's finding that Mase '456's solid electrolyte body (28) and inner gastight ceramic layer (50) should be nonporous. Hence, we accept that finding as fact. *In re Kunzmann*, 326 F.2d 424, 425 n.3 (CCPA 1964). Certainly, the term "gastight" indicates that the inner gastight ceramic layer (50) should be nonporous. As for the electrical insulating layer (54), Mase '456 teaches that electrical insulating layer (54) is made of the same materials as insulating layers 20, 26 and 34 which preferably are porous (col. 6, ll. 61-62; col. 8, ll. 11-13). In Mase '456's Figure 3 the porosity of insulating layers 20, 26 and 34 appears to be indicated by dots over the surfaces of the layers. The only other layer in that figure having such dots is the electrical insulating layer (54). Hence, Mase '456 indicates that like insulating layers 20, 26 and 34, the electrical insulating layer (54) is porous. As indicated by Suzuki (col. 2, ll. 38-49), if Mase '456's electrical insulating layer (54) is porous and the solid electrolyte body (28) and the inner gastight ceramic layer (50) are nonporous, the grains in electrical insulating layer (54) are coarser (i.e., larger) than those in solid electrolyte body (28) and inner gastight ceramic layer (50).

The Appellants argue that Suzuki does not disclose adjusting the sintered particles of a particular layer to be larger than particles of other layers (Br. 15).

All of the Appellants' claims are product claims. The Appellants' claim requirement that an average size of the boundary layer sintered particles is adjusted to be larger than an average size of the solid electrolytic substrate layer sintered particles and insulating substrate layer sintered particles is a product-by-process limitation. The patentability of a claim in product-by-process form is determined based on the product itself, not on the method of making it. *See In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985) ("If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process."). Whether a rejection is under 35 U.S.C. § 102 or § 103, when the appellants' product and that of the prior art appear to be identical or substantially identical, the burden shifts to the Appellants to provide evidence that the prior art product does not necessarily or inherently possess the relied-upon characteristics of the Appellants' claimed product. *See In re Fitzgerald*, 619 F.2d 67, 70 (CCPA 1980); *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977); *In re Fessmann*, 489 F.2d 742, 745 (CCPA 1974). The reason is that the Patent and Trademark Office is not able to manufacture and compare products. *See Best*, 562 F.2d at 1255; *In re Brown*, 459 F.2d 531, 535 (CCPA 1972). As discussed above, Mase '456's electrical insulating layer (54) appears to be porous. Therefore, as indicated by Suzuki (col. 2, ll. 38-49), that layer appears to have a larger average particle size than that of the adjacent solid electrolyte body (28) and inner gastight ceramic layer (50) which appear to

be nonporous, Hence, Mase '456's combination of the solid electrolyte body (28), electrical insulating layer (54) and inner gastight ceramic layer (50) appears to be identical or substantially identical to the Appellants' combination of a solid electrolytic substrate layer, boundary layer and insulating substrate layer. Thus, the burden has shifted to the Appellants to provide evidence to the contrary, and the Appellants have not carried that burden.[1]

Claims 37 and 43

Findings of Fact

Mase '126 discloses a multilayered air-fuel ratio sensor comprising a high electric resistance ceramic layer (12) between a solid electrolyte layer (4) and a ceramic layer (8) (col. 2, ll. 54-56, 61-65; col. 6, l. 68 – col. 7, l. 1).

Analysis

The Appellants' claims 37 and 43 require that the solid electrolytic substrate layer is made of partially-stabilized zirconia and the boundary layer is made of alumina, and that a thermal expansion coefficient of the partially-stabilized zirconia is substantially the same as that of the alumina.

The Appellants argue that Mase '456's insulating layers (20, 26, 34) are porous to minimize stress due to the difference in coefficient of thermal expansion between those layers and the solid electrolyte materials (8, 10, 28) and thereby prevent flake-off between the insulating layers (20, 26, 34) and

[1] Accordingly, we are not persuaded by the Appellants' argument that the recitation in claims 45-48 that the average size of the original particles of the boundary layer is smaller than an average size of the original particles of each of the substrate layers distinguishes the Appellants' product over that of Mase '456 (Br. 16)

the solid electrolyte materials (8, 10, 28) (col. 6, ll. 61-68), and that if there were no difference in coefficient of thermal expansion there would be no reason for Mase '456 to make the insulating layers (20, 26, 34) porous (Br. 18-19).

Mase '456's solid electrolyte materials include alumina (col. 6, ll. 52-54), and Mase '126 indicates that alumina and yttria-stabilized zirconia are alternative solid electrolyte materials (col. 2, ll. 38-39; col. 4, ll. 49-51). Mase '456's electrical insulating materials include borosilicate glass and mullite (col. 6, ll. 50-56; col. 8, ll. 11-13), and Mase '126 indicates that borosilicate glass, mullite and alumina are alternative insulating materials (col. 3, ll. 53-56). Hence, Mase '456 and Mase '126 would have led one of ordinary skill in the art, through no more than ordinary creativity, to use yttria-stabilized zirconia as Mase '456's solid electrolyte material and alumina as Mase '456's electrical insulating material. *See KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (In making an obviousness determination one "can take account of the inferences and creative steps that a person of ordinary skill in the art would employ"). The yttria-stabilized zirconia and the alumina would have the same properties of those of the Appellants' yttria-stabilized zirconia (Spec. 8:4-5) and alumina including the relative coefficients of thermal expansion. *See In re Papesch*, 315 F.2d 381, 391 (CCPA 1963) ("From the standpoint of patent law, a compound and all of its properties are inseparable; they are one and the same thing.") Moreover, Mase '126's disclosure that coefficients of thermal expansion of materials including porous and nonporous materials are matched, apparently to prevent warping (col. 2, ll. 27-29, 54-56; col. 3, ll. 36-52; col. 4, ll. 62-68), would have indicated to one of ordinary skill in the art that it is

desirable to select, among alternative materials, those which minimize differences in coefficient of thermal expansion.

Conclusion of Law

The Appellants have not indicated reversible error in the Examiner's determination that the applied prior art would have rendered prima facie obvious, to one of ordinary skill in the art, an average size of boundary layer sintered particles which is larger than an average size of sintered particles of each of an adjacent solid electrolytic substrate layer and an adjacent insulating substrate layer (claims 1, 2, 4, 6, 7, 10, 11, 18-22 and 25, 26, 28-33, 35, 36, 38, 39, 41, 42 and 44-48), or a solid electrolytic substrate layer made of partially-stabilized zirconia and a boundary layer made of alumina, where a thermal expansion coefficient of the partially-stabilized zirconia is substantially the same as that of the alumina (claims 37 and 43).

DECISION/ORDER

The rejections under 35 U.S.C. § 103 of claims 1, 2, 4, 6, 7, 10, 11, 18-22, 26, 29-33, 36-39 and 42-48 over Mase '456 in view of Suzuki, claims 25, 28, 35 and 41 over Mase in view of Suzuki and either Watanabe or Ikezawa, and claims 37 and 43 over Mase '456 in view of Suzuki and Mase '126 are affirmed.

It is ordered that the Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

tc

NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203